

# PROGRESS OF THEORETICAL PHYSICS

*Founded by H. Yukawa in 1946 Kyoto*

## Advisory Council

K. HUSIMI, <i>Nagoya</i>	M. KOBAYASI, <i>Kyoto</i>
M. KOTANI, <i>Tokyo</i>	T. MUTO, <i>Tokyo</i>
T. NAGAMIYA, <i>Osaka</i>	M. TAKETANI, <i>Tokyo</i>
S. TOMONAGA, <i>Tokyo</i>	

## Editor

H. YUKAWA, *Kyoto*

---

Volume 49

---

*APR.*  
JANUARY-JUNE

1973

*Published for the*  
**Research Institute for Fundamental Physics**  
*and*  
**The Physical Society of Japan**





# 404 i CONTENTS

## No. 1 January

<b>Theoretical Study of Optical Absorption Curves of Molecules. I</b> — <i>Feasible Method to Calculate Optical Absorption Curves of Large Molecules</i> — .....	Toshiaki Kakitani	1
<b>The Unrestricted Hartree-Fock Theory of Chemical Reactions. II</b> — <i>Dissociation Reaction of Asymmetric Two-Center Two-Electron System</i> — .....	Hideo Fukutome	22
<b>Microscopic Dielectric Constant in Insulators</b> .....	Yositaka Onodera	37
<b>Roton-Roton Interactions in Superfluid Helium. II</b> ..	Katsuhiko Nagai	46
<b>Flux-Line Lattices of Pure Type II Superconductor with Anisotropic Fermi Surface (<math>T \sim 0</math>)</b> .....	Kenji Takanaka	64
<b>Spin Waves in a One-Dimensional Heisenberg Antiferromagnet</b> .. .....	Akihide Oguchi and Yoshihiro Tsuchida	76
<b>Critical Properties of Ising Models Containing Dilute Impurities</b> .. .....	Takeo Osawa and Katurō Sawada	83
<b>Quantum Effect in D.C. and Hall Conductivities</b> — <i>An Application of Wigner Representation</i> — ..	Kazuo Kitahara and Yoshiyuki Ono	89
<b>Expansion of a Critical Exponent in Inverse Powers of Spin Dimensionality</b> .....	Ryuzo Abe	113
<b>Langevin Equation for General Harmonic Heat Bath. I.</b> .....	Koh Wada and Jun-ichi Hori	129
<b>Remarks on Statistical Mechanics of Interacting Systems</b> .....	Akira Isihara and Yasushi Takahashi	146
<b>Origin of Interstellar Molecules</b> .....	Mikio Shimizu	153
<b>Gravitational Instability of Regular Model-Universes in a Modified Theory of General Relativity</b> .....	Hidekazu Nariai	165
<b>A Microscopic Theory of the So-Called "Two-Phonon" States in Even-Even Nuclei. I</b> — <i>Basic Ideas</i> — .....	Nobuo Kanesaki, Toshio Marumori, Fumihiko Sakata and Kenjiro Takada	181
<b>Photoproductions of Vector Mesons from Complex Nuclei</b> .....	Toshimasa Egusa	206
<b>Helicity Conservation and the Drell-Hiida-Deck Effect</b> .....	Shigenori Kagiya and Masayuki Uehara	216
<b>Role of Diffractive Excitation Mechanism in Multiple Production of Hadrons</b> .....	Masayuki Uehara	227
<b>Relativistic Eikonal Approximation and Vector Meson Exchange Effect</b> .....	Masaru Doi and Tsuneyuki Kotani	242
<b>Inelastic <math>e</math>-<math>P</math> Scattering Process Involving Detected Final Proton</b> .. .....	Masao Sato	256



<b>Deep Inelastic Lepton-Nucleon Scattering and the Core Structure of Nucleons in the Framework of the Quark-Parton Model .....</b>	Bjong-Ro Kim and Rudolf Rodenberg	267
<b>On the Generating Functional and Sum Rules for Correlation Functions in Inclusive Reactions ..</b>	Yoshihiro Akiyama and Shoichi Hori	276
<b>High Energy Photo-Reactions and Generalized Vector Meson Dominance Model in the Relativistically Extended Quark Model ..</b>	Tsunehiro Kobayashi	282
<b>On the <math>4S=0</math> and <math>4N'=1</math> Non-Leptonic Interaction in the New Nagoya Model .....</b>	Takemi Hayashi, Tutomu Karino, Masahisa Matsuda and Shuzo Ogawa	293
<b>Theory of Interacting Spin-3/2 Particle .....</b>	Takeshi Fukuyama and Kunio Yamamoto	304
<b>Interactions of Elementary Particles in Dual Parton Model .....</b>	Yoshio Miyatake	316
<b>On the Interaction of Extended Particles. II—Construction of General Vertex Operator— .....</b>	Tetsuo Gotō and Takashi Obara	322
<b>Neutral Scalar Field Theory with a Point Source .....</b>	Shigeaki Nagamachi and Nobumichi Mugibayashi	329
<b>Letters to the Editor:</b>		
Feynman Rules for the Higgs Model .....	K. Nishijima and T. Watanabe	341
A Comment on the $S$ -Type Negative Resistance of CdSe at Low Temperatures ..	T. Ando	343
Eigenvalues of the Casimir Operators of $U(n)$ and $SU(n)$ for Totally Symmetric and Antisymmetric Representations.....	K. Kobayashi	345
A Note on the Freezing Curve of Binary Mixture with Chemical Reaction..	T. Yamada	347
$\gamma$ - $\gamma$ Total Hadronic Cross Section and Absorption of Extragalactic $\gamma$ -Rays .....	K. Terasaki-Okada	349
On the Selection Rule of Weak Processes and Decays of New Particles .....	T. Hayashi, M. Nakagawa, H. Nitto and S. Ogawa	350
Effect of the Form Factor on the New Particle's Decay .....	T. Hayashi, M. Matsuda and S. Ogawa	353
Tomita-Tanaka Approximation in the Ising Limit.....	L. A. Murray and B. Frank	355
Kinetic Equations for the Particle Density in $\mu$ Space .....	H. Mori	357
$K_L \rightarrow \mu^+ \mu^-$ Decay and Massive Axial Photon .....	Y. Miyamoto	359
Boltzmann Equation in Amplifying Phonon System.....	K. Nakamura	361
Large Branching Ratio of the $\eta \rightarrow \pi^0 \gamma \gamma$ Decay and the Possible Existence of a New Kind of Boson (Fujii Boson?) with Mass Smaller than $m_\eta$ .....	K. Matumoto	363
Non-Conservation of the Unitary-Singlet Axial-Vector Current and the Possible Role of the Fujii Boson with Mass Larger than $m_\eta/2$ .....	K. Matumoto	365
Magnetic Properties of One-Dimensional Random XY Model .....	F. Matsubara and S. Katsura	367
Excitation of Hadronic Matter and $H$ -Quantum.....	M. Nagasaki and M. Taketani	368
<b>Erratum :</b>		
The Ginzburg-Landau Equation for $^3P_2$ Pairing— <i>Superfluidity in Neutron Stars</i> — (Vol. 48, p. 766).....	T. Fujita and T. Tsuneto	371



## No. 2 February

<b>Ferromagnetism and Antiferromagnetism in 3d Transition Metals</b>	
..... Setsuro Asano and Jiro Yamashita	373
<b>The Temperature Dependence of Phonon Velocity and Roton</b>	
Minimum in Liquid He II .....	Takeji Kebukawa 388
<b>Phase Transition in Bose Liquid. II</b> .....	Shokichi Kanno 401
<b>Scaling Laws and Critical Exponents of Condensed Bose Liquid ..</b>	
..... Shokichi Kanno	416
<b>Critical Exponents for Long-Range Interactions. I—Dimensionality,</b>	
<i>Symmetry and Potential-Range—</i> .....	Masuo Suzuki 424
<b>Critical Exponents and Scaling Relations in <math>1/n</math> Expansion</b> .....	
..... Ryuzo Abe and Shinobu Hikami	442
<b>A Formalism for Ising Model Cumulant Green Functions</b> .....	
..... B. Frank and L. A. Murray	453
<b>Dynamical Contraction of Rotating Gaseous Spheroids</b> .....	
..... Tetsuya Hara, Takuya Matsuda and Kiyoshi Nakazawa	460
<b>Instability of Hydromagnetic Perpendicular Shocks in Inhomogeneous</b>	
<b>Fluids</b> .....	Hatuo Yamazaki 479
<b>Theory of Pairing Vibration Mode</b> ....	Haruo Ui and Hiroyuki Sagawa 491
<b>Final-State Interaction between the <math>\Lambda^0</math>-Hyperon and Residual Nucleus</b>	
$R_3$ in the Reaction $K^- + {}^4\text{He} \rightarrow \pi + \Lambda^0 + R_3$ . I— <i>Single-Channel Cal-</i>	
<i>culatation—</i> .....	Yoshihiko Iwamura 507
<b>Absorption Mechanism of Pions and Nuclear Correlation</b> .....	
..... Yasuhiko Futami and Tsuneyuki Hiramoto	524
<b>Helicity-Amplitude Description of Low-Energy Nucleon-Nucleon Scat-</b>	
<b>tering</b> ....	Mamoru Kawasaki, Wataro Watari and Minoru Yonezawa 531
<b>Remarks on the Regge-Like Behaviour of the One-Boson-Exchange</b>	
<b>Amplitude in Low-Energy Nucleon-Nucleon Scattering—<i>K-Ma-</i></b>	
<i>trix Method—</i> .....	Yoshinori Susuki 541
<b>Single Particle Distributions in the Small <math>\alpha</math> Region</b> .....	Sunao Sakai 552
<b>Urbaryon Rearrangement and the Breaking of Line Reversal Rela-</b>	
<b>tions. I</b> .....	Takeo Matsuoka and Shoji Sawada 562
<b>Strong Decay Rates of Baryon Resonances in a Two-Body Composite</b>	
<b>Baryon Model</b> .....	Seiji Ono 573
<b>Analytic Properties of the Impact Parameter Amplitude</b> .....	
..... Takashi Obara	586
<b>Four-Dimensional Interpretation of the Internal Space Associated</b>	
<b>with the Dual-Resonance Models</b> .....	Masatsugu Minami 594
<b>The <math>\Delta I=1/2</math> Rule in Nonleptonic Weak Decays</b> .....	
..... J. H. Reid and N. N. Trofimenkoff	612
<b>The Leading Light-Cone Singularities and Hadron Collisions</b> .....	



.....Jugoro Iizuka and Hiroshi Okamura	622
<b>Symmetry Breaking of Chiral <math>U(3) \otimes U(3)</math> and <math>X \rightarrow \eta\pi\pi</math> Decay Amplitude</b> ..Makoto Kobayashi, Hiroki Kondo and Toshihide Maskawa	634
<b>Indefinite-Metric Quantum Theory of Genuine and Higgs-Type Massive Vector Fields</b> ..... Noboru Nakanishi	640
<b>CP-Violation in the Renormalizable Theory of Weak Interaction</b> .. ..... Makoto Kobayashi and Toshihide Maskawa	652
<b>On the Application of Parafermion Algebras of Order 2</b> ..... ..... A. L. Carey	658
<b>Weyl Transformations and Poincaré Gauge Invariance</b> ..... ..... Alexander Bregman	667

### Letters to the Editor:

New Types of Integral Equations for Obtaining the Radial Distribution Function of Fluids..... J. Chihara	693
Steady-State Solution of the Functional Random-Walk Model ..... I. Hosokawa	695
Renormalization Group Theory for a One-Dimensional Fermi System .... M. Kimura	697
Deep Inelastic Electron-Deuteron Scattering and Deuteron Structure Functions.... .....R. A. Buchl and B. P. Nigam	699
Internal Conversion Coefficients for Electron Spin Polarized $Fe^{57}$ . II..... ..... H. Ohtsubo, Y. Yokoo and M. Morita	701
$KL^0 \rightarrow 2\gamma$ Decay and $W$ -Boson..... T. Ghosh and M. Dhara	703
Localized Spin Wave States in a Two-Sublattice Ferromagnet ..... ..... T. Tanaka, S. Terakawa and S. Miyazima	705

### No. 3 March

<b>Necessity of Complex Hilbert Space for Quantum Mechanics</b> ..... .....Toshiyuki Toyoda	707
<b>Role of Anisotropy in Spin Dynamics—<i>Slowing Down of Relaxation Time</i>—</b> ..... Tatuo Kawasaki	714
<b>Electronic Structure of Liquid Metals in the Tight-Binding Approximation. I —<i>Single-Site Theory for a Quasi-Orthogonal Set of Atomic Orbitals</i>—</b> ..... Yoshiaki Ishida and Fumiko Yonezawa	731
<b>Renormalization of the Wave-Particle Interaction in Weakly Turbulent Plasmas</b> ..... Mitsuo Kono and Yoshi Hiko Ichikawa	754
<b>On Nonlinear Dynamics of Fluctuations</b> ..... ..... Hazime Mori and Hirokazu Fujisaka	764
<b>X-Ray Emission from White Dwarfs in Close Binary Systems</b> .... ..... Reiun Hōshi	776
<b>Gravitational Field of Slowly Rotating Deformed Masses</b> ..... ..... Humitaka Sato and Akira Tomimatsu	790
<b>A Molecular-Orbital Model of the Atomic Nuclei</b> ..... ..... Yasuhisa Abe, Jun Hiura and Hajime Tanaka	800
<b>An Analysis of Some Neutron Transfer Reactions Using Microscopic</b>	



<b>Form Factors</b> ..Masamichi Igarashi, Mitsuji Kawai and Koichi Yazaki	825
<b>Extension of the Single-Particle Description in Nuclear System. I</b> — <i>General Theory in the Truncated Space</i> —.....Kenji Suzuki	852
<b>Relativistic Corrections to Nuclear Magnetic Moments and Gamow-Teller Matrix Elements of Beta Decay</b> .....	
.....Hisao Ohtsubo, Mitsuo Sano and Masato Morita	877
<b>Backward <math>K^+p</math> Elastic Scattering and the Existence of <math>Z_1^*</math></b> .....	
.....Toshiaki Karasuno	885
<b>Increase of Single-Particle Spectra and a New Form of Scaling</b> — <i>Inclusive Reactions and Urbaryon Rearrangement Diagrams</i> . V—..... Kisei Kinoshita and Hujio Noda	896
<b>On the Phenomenological Compatibility of the Self-Reproducing-Cut Pomeron with Arnold and Barnett's Shielding-Cut Mechanism in Proton-Proton Diffraction Scattering</b> .....	
..... Haruo Fujisaki and Ei-ichi Akiba	914
<b>Generalized Vector-Meson Dominance and High Energy Electron-Proton Inelastic Scattering</b> .....	
..... Masanori Kobayashi	926
<b>Internal Orbital Angular Momentum and Partial Decay Widths of Baryon Resonances</b> .....	
..... Masanobu Hirano, Kenzō Iwata, Yasuo Matsuda and Toshiyuki Murota	934
<b>What Model of Hadrons Does the Lepton-Hadron Collision Require ?</b> ..... Akira Kakuto and Hirofumi Senju	957
<b>A Model of Weak Interaction Based on the Three-Triplet Model of Hadrons</b> .....	
.....Kanji Fujii, Mituaki Katuya, Seiji Okubo and Shin-ichiro Tamura	975
<b>A Model of Weak Interaction Based on the Three-Triplet Model of Hadrons. II</b> — <i>High-Energy Neutrino Inclusive Reactions</i> — .....Shin-ichiro Tamura and Kanji Fujii	995
<b>Hadron Symmetries and Gauge Theory of Weak and Electromagnetic Interactions</b> .....	
..... Ziro Maki and Toshihide Maskawa	1007
<b>An Integral Formula for the Unequal-Mass Wick-Cutkosky Model of the Bethe-Salpeter Equation</b> .....	
..... Noriaki Setō	1014
<b>Cluster Restrictions on Parafermi Operators</b> .....	
..... D. A. Gray	1027
<b>Letters to the Editor:</b>	
Dual Resonance Model and Scaling in Quasi-Inclusive Process.....	
.....A. Roychowdhury, R. K. Roychowdhury and S. N. Banerjee	1040
Lower Bound for the Number of Partial Waves Necessary for the Experimental Analysis.....	
..... T. Uchiyama	1042
Stochastic Geometry and Hard-Disk System .....	
..... T. Ogawa and M. Tanemura	1044
A Note on the Quasi-Ground Band.....	
..... A. Hasegawa and H. Tanaka	1046
Decays of Vector Mesons into Lepton Pairs and Deviation from $e-\mu$ Universality .....	
.....Y. Koide	1048
On the Unrestricted Hartree-Fock Theory of Chemical Reactions.....	
.....S. Huzinaga	1050



Two-Nucleon Transfer Amplitudes in the Ground-State Rotational Bands of Even Nuclei .....	M. Yamamura	1052
The Generalized Seniority Scheme in $N=50$ Nuclei.....	M. Nomura	1054
Elastic Scattering of High-Energy Proton from $^{12}\text{C}$ .....	H. Matsuzaki	1056
On a Scaling Parameter for the Multiplicity Distribution in High Energy Interactions .....	T. Tati and K. Yokoyama	1058
Correlation Parameters $f_2, f_3$ and $f_4$ for the Multiplicity Distribution in High Energy Interactions .....	H. Minakata, T. Tati and K. Yokoyama	1060
Landau-Lifshitz Equation of Motion for Ferromagnetic Systems .....	T. Yamada, H. Fujisaka and H. Mori	1062
On a Heisenberg Ferromagnet by a Second Order Green Function Approach ....	T. Kawabe	1064
Spin Current Correlations and Ferromagnetism. I — <i>Complete Ferromagnetism in Solids</i> — .....	T. Izuyama	1066
Spin Current Correlations and Ferromagnetism. II — <i>General Ferromagnetism in Solids</i> — .....	T. Izuyama	1068
Calculation of Critical Slowing Down Exponent Using Wilson's Expansion Methods .....	M. Suzuki and G. Igarashi	1070
Isotropic Solutions for the Generalized G-L Equation .....	T. Fujita	1072
Critical Exponent $\eta$ up to $1/n^2$ for the Three-Dimensional System with Short-Range Interaction.....	R. Abe	1074

## No. 4 April

<b>Application of the Coherent Potential Approximation to Impurity Problems in Superconductor. I — <i>Resonance Scattering</i> — ..</b>		
..... Fumihiko Takano, Kazushige Machida and Fumiaki Shibata		1077
<b>Critical Exponents and Scaling Relations in <math>1/n</math> Expansion. II — <i>Classical <math>n</math>-Vector Model with Short-Range Interaction</i> — .....</b>		
..... Shinobu Hikami		1096
<b>Critical Exponents for Long-Range Interactions. II — <i>Universality and Scaling Relations</i> — .....</b>	Masuo Suzuki	1106
<b>Wave Modulations in Anharmonic Diatomic Lattices ....</b>	Akira Tsurui	1121
<b>Langevin Equation for General Harmonic Heat Bath. II ..</b>	Koh Wada	1130
<b>Grain Formation in the Expanding Envelopes of T Tauri Stars ..</b>		
..... Shuzo Nishida and Kiyoshi Nakazawa		1152
<b>Formation of Elements in Neutron Rich Ejected Matter of Supernovae .....</b>	Katsuhiko Sato, Kiyoshi Nakazawa and Satoru Ikeuchi	1166
<b>X-Ray Emission Region of a White Dwarf with Accretion ..</b>	Ko Aizu	1184
<b>Hydrodynamic Calculations of Spherical Gravitational Collapse in the Scalar-Tensor Theory of Gravity .....</b>		
..... Takuya Matsuda and Hidekazu Nariai		1195
<b>Shell-Model Calculation of <math>\alpha</math>-Transfer Form Factors and <math>\alpha</math>-Widths .....</b>	Koichi Yazaki	1205
<b>Field Theoretic Description of <math>(\pi^+, p)</math> and <math>(p, \pi^+)</math> Reactions in Nuclei.....</b>	B. R. Wienke	1220



<b>Resonance Correlation and Zeros of Scattering Amplitudes.....</b>	
..... Masahiro Imachi, Takahisa Kuroiwa and Fumihiko Toyoda	1233
<b>Urbaryon Rearrangement and <math>D/F</math> Ratios.....</b>	
..... Takeo Matsuoka and Shoji Sawada	1251
<b>The Baryon Spectrum and Reflection Partners .....</b>	Masakuni Ida 1259
<b>Feynman Diagram Approach to Dual-Parton Model. I—<i>Complication Due to Parton's Isospin</i>— .....</b>	Takeshi Kanki 1271
<b>Reinterpretation of the Two-Dimensional Internal Space Associated with Dual-Resonance Models. I—<i>Conformal-Spin Zero Case</i>— .....</b>	Masatsugu Minami 1281
<b><math>K_{13}</math> Decays and <math>(1, 8) + (8, 1)</math> Symmetry Breaking .....</b>	
..... Tomiyoshi Uchida and Tsuneo Suzuki	1298
<b>Non-Leptonic Decay in the Theory of <math>O(4)</math> Symmetry .....</b>	
..... Shigeo Sato and Seitaro Nakamura	1312
<b>Further Comments on Quartet Models Based on Fundamental Particles with Fractional Charge .....</b>	
..... Masami Nakagawa and Hidemitsu Nitto	1322
<b>Integrability Condition and Energy-Density Commutation Relation .....</b>	
..... Takeshi Fukuyama	1340
<b>Schwinger's Variation Principle by Means of <math>Q</math>-Number Variation for Non-Linear Lagrangian .....</b>	Reiji Sugano 1352

#### Letters to the Editor:

A Model of Multiple Production Based on the Intuitive Picture of Hadrons. II ..	
..... T. Sasaki	1362
Effect of Spin Fluctuation in Superconductors. II— <i>The Transition Temperature</i> — .....	
..... T. Kitamura and C. Inoue	1364
A Note on the Degree of Decrease of Green's Function in Isotopically Disordered Harmonic Chains .....	T. Asahi 1366
Yang-Mills-Maxwell System in Weinberg Model .....	M. Abe 1368
Fluctuation Energies in $SF$ Model and Phenomenon of Shrinkage .....	
..... A. N. Mantri and P. C. Sood	1369
On the Phase of Pulsar Evolution— <i>A Comment on Tsarevsky's Paper</i> — .....	
..... K. Aizu and M. Taketani	1371
Transport Coefficients of van der Waals Fluid Mixtures Near the Critical Point ..	
..... B. Cichocki	1372
Causality and Particle-Like Solution of Classical Scalar Field .....	T. Matsuda 1374
Acausality and Renormalizability .....	N. Nakanishi 1376
Kondo Temperature of a Magnetic-Impurity Pair .....	K. Sato and Y. Nagaoka 1377

#### Errata:

Dip-Bump Structure of Hadron Large Angle Scattering in Terms of Multiple Scattering Mechanism and the Spin Correlation Parameters (Vol. 46, p. 1125) ..	
..... S. Wakaizumi	1380
On the Reality of the Inner State in the Kaonic Atom (Vol. 48, p. 1427) .....	
..... M. Atarashi and H. Narumi	1382
SUBJECT INDEX TO VOLUME 48 (Vol. 48, p. 2458) .....	1382



- Remarks on the Regge-Like Behaviour of the One-Boson-Exchange Amplitude in  
Low-Energy Nucleon-Nucleon Scattering—*K-Matrix Method*— (Vol. 49, p.  
541)..... Y. Susuki 1382

## No. 5 May

- Models for Cooperative Mechanism in Proteins Composed of Subunits**  
..... Hiroko Tada 1383
- Magnetoresistance due to Electron-Spin Scattering in Antiferromagnetic Metals at Low Temperatures** ..... Hiroshi Yamada and Satoshi Takada 1401
- On a Problem in Random-Lattice Statics** — *Application to Fluorescence Quenching in Solid Phosphors Containing Random Imperfections*—..... R. Nandini and N. Kumar 1420
- On the Yang-Lee Distribution for a van der Waals Fluid Near the Critical Point** ..... John Elvey 1428
- Critical Exponents for Long-Range Interactions. III—*Scaled Equation of State*—**..... Masuo Suzuki 1440
- Critical Behavior of the Anisotropic Classical  $n$ -Vector Model** .... Masuo Suzuki 1451
- Application of the Coherent Potential Approximation to Impurity Problems in Superconductors. II—*Classical Spin*—** ..... Fumihiko Takano and Kazuo Fujiki 1459
- Singlet Ground State of the Localized  $d$ -Electrons Coupled with Conduction Electrons in Metals** ..... Isamu Okada and Kei Yosida 1483
- Notes on Variation Principles in the Quantum and Classical Theories of Transport Processes**..... Huzio Nakano 1503
- Statistical-Mechanical Theory of Kinetic Equations—*Kinetic Equations for Dense Gases and Liquids*—** ..... Hazime Mori 1516
- Collapse of a Charged Dust Distribution** ..... Utpal K. De 1546
- Spin Precession of a Charged Particle in a Magnetic Field Including the Effects of General Relativity** ..... A. R. Prasanna and N. Kumar 1553
- On the Motion of a Gyroscope in an External Gravitational Field** ..... Minoru Omote 1559
- On Contraction of Stellar System** ..... Katsuo Takarada 1567
- Nuclear Excitation by Electron Transition and Its Application to Uranium 235 Separation** ..... Masato Morita 1574
- Generator Coordinate Method Applied to  $^{20}\text{Ne}$**  ..... Tsutomu Une 1587
- Off the Energy Shell  $T$  Matrix. II—*Triplet State*—** ..... Toshinori Takemiya 1602
- On a Class of High-Energy Elastic Amplitudes Associated with Rising Total Cross Sections** ..... David Kiang and Katsusada Morita 1616



<b>Exchange Degenerate Regge-Pole Model for <math>np</math> and <math>p\bar{p}</math> CEX Scattering</b> .....	B. K. Pal	1630
<b>Analysis of One-Particle Distributions and Inclusive Reaction Asymmetries within the Completely Symmetric Duality Scheme</b> ....	Masataka Hosoda and Hisakazu Inagaki	1642
<b>Productions and Decays of Short-Lived Particles in <math>e^+e^-</math> Colliding Beam Experiments</b> .....	Shoichiro Kawasaki, Tadahiko Shirafuji and S. Y. Tsai	1656
<b>Properties of the Spinor-Spinor Bethe-Salpeter Equation Coupling Constant</b> .....	B. J. Brennan and R. F. Keam	1679
<b>On the Conformal Invariance of the Mass Condition for Light-like Particles</b> .....	M. Seetharaman	1685
<b>Reinterpretation of the Two-Dimensional Internal Space Associated with Dual-Resonance Models. II —<i>Conformal-Spinor Case</i>—</b> .....	Masatsugu Minami	1689
<b>A Realistic Model of Convergent Relativistic Quantum Mechanics of Interacting Particles</b> .....	Hideji Kita	1704
<b>Classical and Quantum Mechanics of a One-Dimensional Relativistic Elastic Continuum</b> .....	Takehiko Takabayasi	1724
<b>Letters to the Editor:</b>		
$\xi$ -Limiting Process and Additive $\delta L$ ( $\sim i\delta^4(0)$ ) Term.....	T. Fukuyama	1746
An Ising Ferromagnet with Dilute Impurities .....	N. Matsudaira	1748
Localized Spin Wave States in Ferrimagnets .....	T. Tanaka, S. Terakawa and S. Miyazima	1750
Method of Symmetry-Breaking Potential in Statistical Mechanics of the Long-Range Order .....	H. Nakano and M. Hattori	1752
On Itô's Derivation of the Phase of $\epsilon$ in Neutral Kaon Decay.....	P. K. Kabir and B. G. Kenny	1754
Asymptotic Behavior of Off-Mass-Shell Form Factors .....	K. Nakazawa	1755
Charge Conservation Law and Two-Particle Correlations in Inclusive Reactions....	Y. Akiyama	1758
Simple Properties of Corrections to the Regge-Pole Amplitudes in Charge and Hypercharge Exchange Reactions .....	K. Honda, T. Suzuki and K. Fukushima	1760
Stellar Accretion and X-Ray Source. II .....	S. Sakashita	1763
A Study of $\alpha$ -Widths of $^{20}\text{Ne}$ Based on $^{16}\text{O}$ and $\alpha$ -Cluster Model .....	T. Matsuse and M. Kamimura	1765
Angular Distribution of $p$ - $p$ Scattering at High Energies and Radius of the Hard Core .....	M. Nagasaki and M. Taketani	1768
The Sound Generated by Cosmic Turbulence and the Origin of Galaxies .....	T. Matsuda, H. Takeda and H. Sato	1770
Spin Current Correlation and Ferromagnetism. III— <i>Free Fermion Systems</i> —..	T. Izuyama	1772
A Comment on the Conductivity Sum Rule .....	T. Izuyama	1774
A Comment on the Anomalous Magnetic Moment of the Muon in Weinberg's Model .....	H. Kikugawa and R. Sasaki	1776
Schwinger's Variational Principle in Quantum Mechanics with Velocity Dependent Potential. II— <i>Reducible Multi-Dimensional Case</i> — .....	T. Kawai	1777



Ground-State Energy and Phonon Spectra of bcc Solid Helium .....	1779
..... S. Homma, K. Nagai and H. Namaizawa	
Fluctuations around Steady States in Chemical Kinetics .....	1782
..... Y. Kuramoto	

## No. 6 June

<b>Many-Body Effects on Effective Pseudo-Potential in Alkali Metals</b> .....Hiroshi Yasuhara and Mitsuo Watabe	1785
<b>Multi-Branch Structure of the Excitation Spectra in Liquid Helium II</b> ....Takeji Kebukawa, Shuichiro Yamasaki and Sigenobu Sunakawa	1802
<b>The Ground State Energy of the <math>s</math>-<math>d</math> System — <i>The Next Singular Contribution</i>—</b> .....Kiyoshi Kawamura	1821
<b>A Study of Next Divergent Terms for the Singlet Ground State of a Localized Spin in Metals</b> .... Akio Sakurai and Akio Yoshimori	1840
<b>Breakdown of Some Scaling Law Relations in <math>1/n</math> Expansion</b> .... ..... Ryuzo Abe and Shinobu Hikami	1851
<b>Dynamical Properties of One-Dimensional Heisenberg Model</b> .....	
..... Kazuhisa Tomita and Kazuko Kawasaki	1858
<b>Critical Exponent <math>\eta</math> up to <math>1/n^2</math> for the Three-Dimensional System with Short-Range Interaction</b> .....	
..... Ryuzo Abe	1877
<b>A Diffusion Model for the Schrödinger Equation</b> .....	
..... L. Bess	1889
<b>The Radiative Energy Loss from the Shock Front</b> .....	
..... Shinji Narita	1911
<b>Effect of Electron Capture on Temperature and Chemical Composition in Collapsing Dense Stars</b> .....	
..... Kiyoshi Nakazawa	1932
<b>Three-Body Wave Function of <math>\text{Li}^6</math></b> .....	
..... Yoshiko Matsui	1947
<b>Microscopic Description of Scattering of Low-Energy Neutrons by <math>^{12}\text{C}</math>. II — <i>Generalized R-Matrix Method</i>—</b> .....	
..... Akihiko Mori	1960
<b>Analysis of Alpha-Decay Widths for Molecular Viewpoints in Light Nuclei</b> .....	
..... Hisashi Horiuchi and Yasuyuki Suzuki	1974
<b>Deformations of Ground Bands in <math>^{20}\text{Ne}</math>, <math>^{24}\text{Mg}</math> and <math>^{26}\text{Si}</math>. II</b> .....	
..... Yataro Horikawa, Akira Nakada and Yoshiharu Torizuka	2005
<b>Non-Linear <math>\pi</math>-<math>B</math> Exchange-Degenerate Regge Trajectory</b> .....	
..... Takao Kawaguchi, Taichiro Kugo, Shigeru Sasabe and Masako Bando	2021
<b>Two-Particle Correlation Based on Multiperipheral and Diffractive Production Mechanisms</b> .....	
..... Shigenori Kagiya	2031
<b>Total Decay Widths of Resonances and Regge Trajectories</b> .....	
..... Reido Kobayashi	2037
<b>Production Cross Section of <math>\pi N \rightarrow \pi N^*</math> and <math>SU(6) \otimes O(3)</math> Structure</b> ..	
..... Masanobu Hirano, Kenzō Iwata, Yasuo Matsuda and Toshiyuki Murota	2047
<b><math>O(3, 1)</math> Symmetry Model and Compton Scattering of Protons</b> ....	
..... Mohammad Saleem	2071
<b>Limiting Fragmentation and Bjorken Scaling in a Baryon Exchange Model</b> .....	



Takeshi Ebata, Tyuyo Kasahara, Kenzo Ishikawa and Tomoya Akiba	2079
<b>Nonleptonic Decays and Sub-Hadronic Interaction. I</b> — <i>Studies of Kaon Decays</i> — .....	
Mituaki Katuya and Yoshio Koide	2092
<b>On the Equivalence of Unitary- and Renormalizable-Gauge Formulations of a Massive Gauge Theory</b> .....	
Ken'ichi Shizuya	2106
<b>Super-Quantization. I</b> .....	
Susumu Okubo	2125

### Letters to the Editor:

Coriolis Coupling for $1/2^-$ [510] Neutron State in $^{176}\text{Lu}$ ..D. K. Gupta and P. C. Sood	2133
Deuteron Form Factors with Soft-Core Potentials.....S. S. Raghavan	2135
Inequalities in Neutral $K$ -Meson Decay .....	
Y. Itô	2137
Interference Effect in the Spin-Flip Probability at an Isobaric Analog Resonance .....	
S. Takeuchi, N. Matsuoka, K. Koyama and H. Sakaguchi	2139
Non-Diffractive Mechanism in Multi-Particle Production Processes .....	
T. Morii and H. Noda	2141
Diffractive Mechanism in Multi-Particle Production Processes.. T. Morii and H. Noda	2143
Angular Distribution of $p$ - $p$ Elastic Scattering at High Energies and Distribution of Absorption.....	
M. Nagasaki and M. Taketani	2145
A Comment on the Dust Grain Model for Primary Cosmic Rays..K. Terasaki-Okada	2147
Fluctuation-Dissipation Theorem for an Open System .....	
T. Kawasaki	2149
Mori Formula in Open Systems.....	
T. Kawasaki	2151
Theory of the Urbach-Martienssen Rule for Mixed Crystals.....	
T. Sawai, S. Ueno and T. Matsubara	2152
$\bar{B}B\bar{S}$ Coupling Constants Directly from $\sigma$ -Terms.....K. K. Sinha and V. P. Gautam	2155
Modified KDP Model on the Kagomé Lattice .....	
F. Y. Wu	2156
Dirac Particle Involving Internal Oscillators.....	
D. Itô	2158
Sum Rules for Radiative Weak Nonleptonic Decays .....	
Y. Kohara	2159
Comments on Parity Violating Neutral Currents in Weak Interactions .....	
M. Kuroda and Y. Yamaguchi	2160
Paramagnetic Resonance Line Width of a Linear Chain.....	
H. Mashiyama	2163
On the Semi-Leptonic Processes. II.....	
E. Kawai, S. Ogawa and Y. Yamamoto	2165

### Errata :

Modified Slater Model in Kagomé Lattice (Vol. 40, p. 425) .....	
S. Miyazima and I. Syozi	2167
Theoretical Study of Optical Absorption Curves of Molecules. I — <i>Feasible Method to Calculate Optical Absorption Curves of Large Molecules</i> — (Vol. 49, p. 1) .....	
T. Kakitani	2167
Author Index to Volume 49 .....	2169
Subject Index to Volume 49 .....	2177
Contents to Volume 49 .....	i



